

What is claimed is:

1. A magnetic composition comprising magnetic particles wherein each particles is surrounded by an insulating layer, and further wherein the magnetic particles have grain sizes from 1 to 100 nanometers.

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2. The composition of claim 1, wherein the magnetic particles comprise a magnetic component selected from the group consisting of transition metals, Fe, Co, Ni, Mn, transition metal intermetallic alloys, Fe-Ni, Fe-Co, Co-Ni, Fe-B, Fe-N, Fe-Zr, Fe-Si, Fe-Si-B, Fe-Zr-B, Fe-P-B, Mn-Zn, transition metal-rare earth alloys, Fe-Nb, Fe-Sm, and mixtures comprising at least one of the foregoing.

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3. The composition of claim 1, wherein the insulating layer is a high dielectric ceramic or polymeric material.

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4. The composition of claim 1, wherein the magnetic particle-particle separation is about 0.5 to about 50 nm.

5. The composition of claim 1, wherein the magnetic particle-particle separation is about 1 to about 20 nm.

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6. A method for the formation of a magnetic composition, comprising
fabricating a precomposite from a precursor composition;
forming magnetic nanostructured particles surrounded by a dielectric layer from a
precomposite; and
5 passivating the surface of the surrounded nanostructured particles.
7. A method for forming a consolidated bulk magnetic/insulator nanostructured
composite, comprising
preparing a ready-to-press nanostructured composite powder comprising a
10 nanostructured metal core and a dielectric layer;
consolidating the ready-to-press powder into a green compact;
shaping the green compact; and
annealing the shaped compact.
- 15 8. The composition of claim 1, as a component in power transformers, pulse
transformers, filters, and chocks, inductors and linear transformers, linear applications,
microwave antenna, rectenna, circular, as magnetic fluids and in refrigeration applications.